

# PATENT ABSTRACTS OF JAPAN

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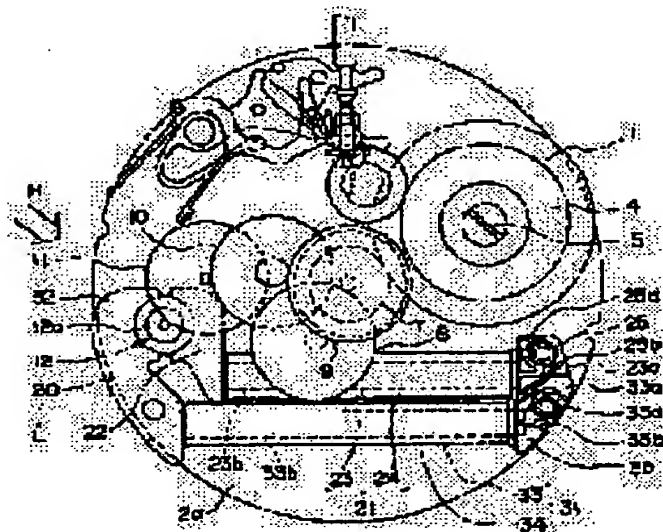
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## (54) ELECTRONIC CONTROL TYPE MECHANICAL WATCH

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an electronic control type mechanical watch for reducing the effect of external magnetic field at reduced cost.

**SOLUTION:** Two coils 24 and 34 are provided for generation and speed regulation and are arranged in parallel each other and each of them is connected in series. A rotor 12 for generation arranged at the side of one coil 24 for a boundary line L where the center axis is along the area between the coils 24 and 34, and the number of turns of the coil 24 is set to at least that of the other coil 34. Since the number of turns of the coil 24 being wound around the core 23 where the area of a core stator part 22 is small is large, so that an electromotive force becomes larger even if a magnetic flux that flows due to an external magnetic field is small. Therefore, the electromotive force by the coil 34 where the external magnetic field flows much can be further canceled out, thus a magnetic noise due to the external magnetic field can be reduced.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy Two or more said coils are prepared in the electronics control type machine clock it was made to govern applying braking to a wheel train. Two or more of these coils It is the electronics control type machine clock characterized by being arranged at a coil side and the number of turns of the coil of the one side of this being more than number of turns of the coil of another side while [ to the boundary line to which, as for said Rota, that medial axis met between each coil ] while being arranged in parallel mutually and connecting each coil to the serial.

[Claim 2] The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy Two or more said coils are prepared in the electronics control type machine clock it was made to govern applying braking to a wheel train. Two or more of these coils It is the electronics control type machine clock which said Rota is arranged on the boundary line to which the medial axis met between each coil, and is characterized by the number of turns of each of said coil being the same number while being arranged in parallel mutually and connecting each coil to the serial.

[Claim 3] The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy Two or more said coils are prepared in the electronics control type machine clock it was made to govern applying braking to a wheel train. Two or more of these coils While being arranged in parallel mutually and connecting each coil to the serial, said Rota While is arranged at a coil side to the boundary line to which the medial axis met between each coil. For the 1st edge in which Rota was established in the core around which each coil was wound, the surface ratio of each magnetic flow section prepared in the 2nd edge of the opposite side is an electronics control type machine clock characterized by being in inverse proportion to the surface ratio of the stator prepared in the 1st [ of each of said core ] edge side.

[Claim 4] The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy Two or more said coils are prepared in the electronics control type machine clock it was made to govern applying braking to a wheel train. Two or more of

these coils While being arranged in parallel mutually and connecting each coil to the serial, said Rota The amount of maximum saturation magnetic flux of the core around which it has been arranged at the coil side and the coil of one of these was wound for while [ to the boundary line to which that medial axis met between each coil ] is an electronics control type machine clock characterized by being made larger than the core around which the coil of another side was wound.

[Claim 5] The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy Two or more said coils are prepared in the electronics control type machine clock it was made to govern applying braking to a wheel train. Two or more of these coils While being arranged in parallel mutually and connecting each coil to the serial, said Rota The core around which it has been arranged at the coil side and the coil of one of these was wound for while [ to the boundary line to which that medial axis met between each coil ] is an electronics control type machine clock characterized by consisting of the quality of the materials with permeability higher than the core around which the coil of another side was wound.

[Claim 6] The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy Two or more said coils are prepared in the electronics control type machine clock it was made to govern applying braking to a wheel train. Two or more of these coils While being arranged in parallel mutually and connecting each coil to the serial, said Rota To the stator prepared in the 1st edge side in which Rota was established in the core around which it has been arranged at the coil side and each coil was wound for while [ to the boundary line to which the medial axis met between each coil ] For one [ said ] coil, the outside notch formed in the periphery side of the stator to said boundary line while the outside notch was formed is an electronics control type machine clock characterized by being formed in the opposite side to the line which intersects perpendicularly with said boundary line, and passes along the Rota core.

[Claim 7] The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy Two or more said coils are prepared in the electronics control type machine clock it was made to govern applying braking to a wheel train. Two or more of these coils While being arranged in parallel mutually and connecting each coil to the serial, said Rota While is arranged at a coil side to the boundary line to which the medial axis met between each coil. It is the electronics control type machine clock characterized by extending the stator by the side of one [ said ] coil to the location where the distance from said boundary line becomes long rather than the stator by the side of the coil of another side among the stators prepared in the 1st edge side in which Rota was established in the core around which each coil was wound.

[Claim 8] The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy It is the electronics control type machine clock which two or more said coils are prepared and is characterized by carrying out a predetermined include-angle inclination and arranging one coil to the coil of another side among two or more of these coils in the electronics control type machine clock it was made to govern applying braking to a wheel train.

[Claim 9] It is the electronics control type machine clock characterized by setting up the direction of a volume of each of said coil in this direction in an electronics control type machine clock

according to claim 1 to 8.

[Claim 10] The terminal of each of said coil is an electronics control type machine clock characterized by being prepared in either same edge side of the 1st edge in which Rota was established in the core around which each coil was wound in the electronics control type machine clock according to claim 9, and the 2nd edge of the opposite side of the edge.

[Claim 11] It is the electronics control type machine clock characterized by preparing the terminal of each of said coil in the 2nd [ of a core / said ] edge side in an electronics control type machine clock according to claim 10, respectively.

[Claim 12] The connection to the coil lead substrate formed in the core edge in one [ said ] coil end in the electronics control type machine clock according to claim 10 or 11 is an electronics control type machine clock characterized by crossing.

[Claim 13] The 1st edge in which Rota was established in the core around which the coil was wound is an electronics control type machine clock which the terminal of one [ said ] coil is prepared in the 1st edge in which Rota was established in the core around which the coil was wound in an electronics control type machine clock according to claim 9, and is characterized by preparing the terminal of the coil of another side in the 2nd edge of the opposite side.

[Claim 14] It is the electronics control type machine clock characterized by setting the direction of a volume of each of said coil as an opposite direction mutually in an electronics control type machine clock according to claim 1 to 8.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to amelioration of the generator used for control power while it transforms mechanical energy in case a spiral spring opens into electrical energy in part, operating as a driving source and transforms especially mechanical energy into electrical energy about the electronics control type machine clock which a roll control means is operated with this power, and controls a rotation period.

[0002]

[Description of the Prior Art] What was indicated by JP,8-5758,A is known as an electronics control type machine clock which drives correctly the guide fixed to a wheel train, and displays time of day correctly by controlling the current value which mechanical energy in case a spiral spring opens is transformed into electrical energy with a generator, and a roll control means is operated with the electrical energy, and flows in the coil of a generator.

[0003] Drawing 14 and 15 are the top views and sectional views of a clock which were indicated by this official report.

[0004] In drawing 14 and 15, it accelerates the rotational motion force from the barrel vehicle 1 which built in the spiral spring through the wheel train which consists of No. 2 vehicle vehicle [ of No. 8 or 4 ] vehicle [ of No. 9 or 5 ] a vehicle 11 of No. 10 or 6 of No. 7 or 3 supported by the cope plate 2 and the wheel train carrier 3, and it is coordinated with a generator 20.

[0005] A generator 20 is structure similar to the step motor for a drive of the conventional cell drive type electronic clock, and consists of Rota 12, a stator 150, and coil block 160.

[0006] Rota 12 attaches Rota magnet 12a and Rota circle-of-inertia plate 12c in the circumference of the shaft of Rota kana 12b which coordinates and rotates on the No. 6 vehicle 11 at one.

[0007] A stator 150 carries out the coil of the stator-coil 150b of 40,000 turns to stator object 150a.

[0008] The coil block 160 carries out the coil of the coil 160b of 110,000 turns to core 160a. Here, stator-coil 150b and coil 160b are connected to the serial so that the output voltage which applied each generation-of-electrical-energy electrical potential difference may come out.

[0009] And this generator 20 supplies electric power to the electronic circuitry equipped with the crystal oscillator through the capacitor which does not illustrate the power obtained by rotation of Rota 12, and delivery, consequently a wheel train always rotate the control signal of the Rota rotation with a fixed rotational speed in this electronic circuitry according to that damping force

according to rotation detection and reference frequency of Rota in a coil.

[0010] Such an electronics control type machine clock has an unnecessary motor for a movement drive, in order to make a spiral spring into the source of power for the drive of a guide, and it has the description that there are few components mark and it is cheap. The clock was also able to be operated with little input energy that what is necessary is just to generate slight electrical energy required to operate an electronic circuitry moreover.

[0011]

[Problem(s) to be Solved by the Invention] However, if it was in the generator 20 of said structure, the technical problem on the structure described below and an electromagnetic characteristic occurred.

[0012] That is, by the electronics control type machine clock, in order to incorporate a generator 20 in a small tooth space called a wrist watch and to acquire generation-of-electrical-energy capacity sufficient also with the small generator 20, the number of turns of a coil needed to be made [ many ]. On the other hand, since it is necessary to avoid connection with other components, such as a wheel train, while having arranged Rota 12 to the clock inside rather than each stator 150 and the coil block 160, the number of turns of coil 150b of the inside stator 150 were made fewer than the number of turns of coil 160b of the coil block 160, and the tooth space of \*\*\*\* was secured.

[0013] For this reason, although sufficient thing was obtained in the field of generation-of-electrical-energy induced voltage or space efficiency, there was a problem of rotation detection of Rota becoming impossible in response to the effect of an external magnetic field.

[0014] That is, as easiest method of detecting the Rota rotational frequency, the generation-of-electrical-energy wave is detected, and there is the approach of carrying out binarization of this. However, when the area of the stator part around Rota is greatly different especially with each coil block, a clock was brought to the location where an external magnetic field exists for this reason and an external alternating current field occurred, the external alternating current field became a noise, the generation-of-electrical-energy induced voltage of a coil became the complicated Yamagata wave, and detection was difficult for it for this reason, since the location of Rota was partial to each coil as above-mentioned.

[0015] Although \*\*\*\*-proof was prepared in the movement components of a clock or using the ingredient which has \*\*\*\*\*-proof in exterior parts was also considered in order to have reduced the magnetic noise by such external magnetic field, there was a problem that a miniaturization and thin-shape-izing of the part which cost becomes high and prepares \*\*\*\*-proof, and a movement were difficult.

[0016] The purpose of this invention is to offer the electronics control type machine clock which effect of an external magnetic field can be lessened, and can reduce cost.

[0017]

[Means for Solving the Problem] The electronics control type machine clock indicated by claim 1 of this invention The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy Two or more said coils are prepared in the electronics control type machine clock it was made to govern applying braking to a wheel train. Two or more of these coils While being arranged in parallel mutually and connecting each coil to the serial, it is characterized by being arranged at a coil side and the number of turns of the coil of the one side of this being more than number of turns of the coil of another side, while [ to the boundary line to which, as for said Rota, that medial axis met between each coil ].

[0018] In addition, it means connecting so that the electromotive force in each coil may be added as each coil is connected to a serial. That is, the magnetic flux which changes with rotation of Rota passes along the inside of the magnetic circuit which consists of a core around which each coil was wound. For this reason, in the coil each other arranged in parallel, although magnetic flux flows toward an opposite direction mutually, each coil is connected to the serial in this case,



so that the electromotive force in each coil may be added.

[0019] On the other hand, in order that an external magnetic field may work in this direction to the core around which each coil was wound, the electromotive force by the external magnetic field in each coil serves as an opposite direction mutually, and it works so that it may negate each other. And since it is arranged at a coil side and the distance from each coil to Rota differs in this invention in while [ to the boundary line to which the medial axis met / Rota / between each coil ], For example, two coil blocks which consist of winding a coil around said core coil section of the core which consists of the core stator section, the core coil section, and the core MAG flow section are prepared. When said Rota is arranged and constituted between the core stator sections of each coil block, area becomes large to the core stator section by the side of one coil (coil block), and, as for the core stator section by the side of the coil of another side (coil block), the part and an external magnetic field become easy to flow. For this reason, by this invention, by carrying out the number of turns of one coil to more than the coil of another side, even if the flow of an external magnetic field is small, electromotive force by that external magnetic field is enlarged, and the magnetic noise can negate the electromotive force in a coil more and according to an external magnetic field while many said external magnetic fields flow can be decreased.

[0020] The electronics control type machine clock of this invention according to claim 2 is characterized by for the medial axis of Rota having arranged Rota so that it may become the boundary line top which met between each coil which each other has been arranged in parallel and connected to the serial, and making the same number the number of turns of each of said coil.

[0021] According to this invention, since each coil and a core are arranged to a boundary line, i.e., \*\* Rota, at bilateral symmetry, the effect of an external magnetic field can also become the same with each coil, and since the number of turns of each coil are the same number, the electromotive force in each coil by the external magnetic field can be negated mutually, and a magnetic noise can be decreased.

[0022] The electronics control type machine clock of this invention according to claim 3 While arranges said Rota to a coil side to the boundary line to which the medial axis met between each coil. With the 1st edge in which Rota was established in the core around which each coil was wound, the surface ratio of each magnetic flow section (core MAG flow section) prepared in the 2nd edge of the opposite side It is characterized by setting up so that it may be in inverse proportion to the surface ratio of the stator (core stator section) prepared in the 1st [ of each of said core ] edge side.

[0023] An external magnetic field is added also in the magnetic flow section of not only a stator part but each core. Therefore, by making while being small and smaller than the magnetic flow section by the side of a coil (coil block side) area of the magnetic flow section by the side of the coil of another side where the area of a stator is large (coil block side), the area of a stator can make small the difference of the effect of the external magnetic field between each coil, can suppress the effect of an external magnetic field, and can decrease a magnetic noise.

[0024] The electronics control type machine clock of this invention according to claim 4 is characterized by making larger than the core wound around the coil of another side the amount of maximum saturation magnetic flux of the core around which it has arranged to the coil side and the coil of one of these was wound for while [ to the boundary line to which that medial axis met between each coil ] in said Rota.

[0025] Since one core has the amount of maximum saturation magnetic flux larger than the core around which the coil of another side was wound, magnetic flux becomes easy to flow and it can pass more magnetic flux. Therefore, balance with the magnetic flux which while is small, magnetic flux becomes easy to flow even if it is a core side, and flows by this to the core side of another side where the area of a stator (core stator section) is large can become good, the area of a stator (core stator section) can make small the difference of the effect of the external magnetic field between each coil, the effect of an external magnetic field can be suppressed, and a magnetic noise can be decreased.

[0026] The electronics control type machine clock of this invention according to claim 5 is characterized by constituting the core around which it has arranged to the coil side and the coil

of one of these was wound for while [ to the boundary line to which that medial axis met between each coil ] in said Rota from the quality of the material with permeability higher than the core wound around the coil of another side.

[0027] Since the permeability of the core around which one coil was wound is large, magnetic flux becomes easy to flow and more magnetic flux can be passed. For this reason, a difference with the electromotive force in the coil of another side along which magnetic flux passes can become small, can make small the difference of the effect of the external magnetic field between each coil, can suppress the effect of an external magnetic field, and can decrease a magnetic noise.

[0028] The electronics control type machine clock of this invention according to claim 6 While forming an outside notch in the stator prepared in the 1st edge side in which Rota was established in the core around which it has arranged to the coil side and each coil was wound for while [ to the boundary line to which the medial axis met between each coil ] in said Rota With one [ said ] coil, it is characterized by forming in the opposite side to the line which intersects perpendicularly with said boundary line the outside notch formed in the periphery side of the stator to said boundary line, and passes along the Rota core.

[0029] with the coil of an outside [ line / , i.e. , the line whose crossover include angle to a boundary line be 90 degrees , / the line by which a boundary line and an outside notch cross at right angles and pass along the Rota core ] , one [ i.e. , ] , if form in the opposite side , the stator ( core stator section ) area of one coil can become that much large , can make small the difference of the effect of the external magnetic field between each coil , can suppress the effect of an external magnetic field , and can decrease a magnetic noise .

[0030] The electronics control type machine clock of this invention according to claim 7 While arranges said Rota to a coil side to the boundary line to which the medial axis met between each coil. It is characterized by having extended the stator by the side of one [ said ] coil to the location where the distance from said boundary line becomes long rather than the stator by the side of the coil of another side among the stators prepared in the 1st edge side in which Rota was established in the core around which each coil was wound.

[0031] Since the stator by the side of one coil (core stator section) is extended to the long distance rather than the stator by the side of the coil of another side (core stator section), the stator area by the side of the part and one coil can become large, can make small the difference of the effect of the external magnetic field between each coil, can suppress the effect of an external magnetic field, and can decrease a magnetic noise.

[0032] The electronics control type machine clock of this invention according to claim 8 is formed for two or more said coils, and it is characterized by carrying out a predetermined include-angle inclination and arranging one coil to the coil of another side, among two or more of these coils.

[0033] for example, if the coil (coil block) of 1 in all side is adjusted to the include angle of an external magnetic field with the biggest effect to the coil (getting it blocked -- a coil block) of another side whenever [ tilt-angle / which the external magnetic field tends to influence ] , the difference of the effect of the external magnetic field between each coil can be made small, the effect of an external magnetic field can be suppressed, and a magnetic noise can be decreased.

[0034] In each above electronics control type machine clock, since a magnetic noise can be decreased, \*\*\*\*-proof can not necessarily be prepared, or it becomes unnecessary to use an ingredient with \*\*\*\*\*-proof, and cost can be reduced, and a miniaturization and thin-shape-izing of a movement can also be realized easily.

[0035] Moreover, as for the direction of a volume of each of said coil, in each above electronics control type machine clock, it is desirable to be set up in this direction.

[0036] If the direction of a volume over the core of a coil (for example, the direction of a volume over the direction which goes to the core stator section from the magnetic flow section of a core) is the same, in case a coil is twisted around a core, in each coil, it can twist by the same approach, and manufacture effectiveness can be improved.

[0037] Moreover, as for the coil lead substrate with which the terminal of each of said coil was prepared, it is desirable to be prepared in either same edge side of the 1st edge (for example, core stator section) in which Rota was established in the core of each coil, and the 2nd edge (for



example, core MAG flow section) of the opposite side of the edge, and it is desirable to be especially prepared in the 2nd [ of a core / said ] edge side, respectively.

[0038] If the coil lead substrate is formed in the same edge side in each core, the wiring processing from a coil lead substrate becomes easy, and wiring structure can be simplified. If it prepares in the 2nd edge side which is the opposite side in Rota especially, wiring of Rota, a wheel train, etc. and a coil lead substrate does not interfere, but wiring structure can improve further. Furthermore, since the die length of a magnetic circuit can be shortened, iron loss can be decreased.

[0039] Moreover, the connection of one [ said ] coil end to the coil lead substrate formed in the core edge around which one [ said ] coil was wound may cross (cross). When two coil blocks were used, the connection to the lead substrate of the coil end in one coil block was crossed and each coil block is arranged in juxtaposition, each coil can be connected to a serial by connecting the adjoining terminals of the end-winding child of the lead substrate with which connection of the crossing coil end was carried out, and the end-winding child of the lead substrate in the coil block of another side which does not cross. For this reason, a single-sided board can be used as the circuit board, and cost can be reduced.

[0040] Moreover, with the 1st edge in which Rota was established in the core by which the coil lead substrate with which it prepared in the 1st edge in which Rota was established in the core by which the coil lead substrate with which the terminal of one [ said ] coil was prepared was wound around the coil, and the terminal of the coil of another side was prepared was wound around the coil, you may prepare in the 2nd edge of the opposite side.

[0041] Also in this case, since the terminals which adjoin in each coil can be connected in case each coil rolled in this direction is connected to a serial, a single-sided board can be used as the circuit board, and cost can be reduced.

[0042] Furthermore, the direction of a volume of each of said coil may be mutually set as an opposite direction to a core. In this case, wiring structure can be simplified, while being able to use a single-sided board as the circuit board and being able to reduce cost, since the terminals which adjoin with each of that lead substrate can be connected even if it arranges each lead substrate to the same terminal side of each coil in case each coil is connected to a serial.

[0043]

[Embodiment of the Invention] Below, the operation gestalt of this invention is explained based on a drawing.

[0044] Drawing 1 is the top view showing the important section of the electronics control type machine clock of the 1st operation gestalt of this invention, and drawing 2 and 3 are the sectional view.

[0045] The electronics control type machine clock is equipped with the barrel vehicle 1 which consists of spiral spring 1a, barrel gearing 1b, barrel truth 1c, and 1d of barrel lids. As for spiral spring 1a, barrel gearing 1b and an inner edge are fixed to barrel truth 1c for an outer edge. Barrel truth 1c is supported by a cope plate 2 and the wheel train carrier 3, and it is being fixed with the angle hole screw 5 so that it may rotate by the angle hole vehicle 4 and one.

[0046] Although the angle hole vehicle 4 is rotated clockwise, \*\* which is not illustrated has geared with \*\* so that it may not rotate counterclockwise. In addition, since the method of rotating the angle hole vehicle 4 clockwise and rolling spiral spring 1a is the same as that of the automatic volume of a machine clock, or a \*\*\*\* device, explanation is omitted.

[0047] It accelerates 7 times and rotation of barrel gearing 1b is 6.4 one by one to the No. 2 vehicle 7. It double-accelerates. To the No. 3 vehicle 8 9.375 To the No. 4 vehicle 9, it accelerates 3 times, and it accelerates 10 times, each \*\*\*\* 7-11 which it accelerates 10 times to the No. 6 vehicle 11, and serves as an accelerating wheel train to Rota 12 is minded [ it double-accelerates, and ] to the No. 5 vehicle 10, and it is a total of 126,000. It accelerates twice.

[0048] The second hand to which the minute hand to which cylinder kana 7a performs a time stamp to cylinder kana 7a, and which is not illustrated performs a time stamp in the No. 4 vehicle 9 and which is not illustrated is being fixed to the No. 2 vehicle 7, respectively. Therefore, what is necessary is just to control Rota 12 to rotate by 5rps, in order to rotate the No. 2 vehicle 7 by 1rph and to rotate the No. 4 vehicle 9 by 1rpm. Barrel gearing 1b at this time is set to 1/7rph.

[0049] Moreover, disc-like dial 2a is attached in the cope plate 2.

[0050] This electronics control type machine clock is equipped with the generator 20 which consists of Rota 12 and coil blocks 21 and 31. Rota 12 consists of Rota magnet 12a and Rota kana 12b.

[0051] The coil blocks 21 and 31 carry out the coil of the coils 24 and 34 to cores (core) 23 and 33, and are constituted. The core stator sections 22 and 32 which adjoin Rota 12 and are arranged, the core coil sections 23b and 33b around which said coils 24 and 34 are wound, and the core MAG flow sections 23a and 33a connected mutually are formed in one, and cores 23 and 33 are constituted.

[0052] Said each cores 24 and 33 [ 23 and ] 34 of each other, i.e., each coils, are arranged in parallel. And said Rota 12 is arranged at the coil 24 side as opposed to the boundary line L to which the medial axis met the 1st [ of each cores 23 and 33 ] edge side (the core stator section 22 side, 32 sides) between each coil 24 and 34. that is, each part article can be efficiently arranged in dial 2a -- as -- said Rota 12 -- the inner circumference side of dial 2a -- getting it blocked -- it is arranged at the coil 24 side.

[0053] For this reason, as for the core stator section 32 by the side of a periphery, area is greatly formed rather than the core stator section 22 by the side of inner circumference.

[0054] In addition, in the 2nd [ of each cores 23 and 33 ] edge side (core MAG flow sections 23a and 33a), it is connected mutually and cores 23 and 33 form the annular magnetic circuit.

[0055] As cores 23 and 33 are shown also in drawing 4 , the two-sheet laminating of the metal plate is carried out, and it is constituted, and let core MAG flow section 23a and 33a parts be only the plates of one sheet. Thereby, the core MAG flow sections 23a and 33a are being fixed to the cope plate 2 on the screw which it is made to become flat and penetrates both, when it piles up.

[0056] The number of turns of the coil 24 wound around core coil section 23b of a core 23 is carried out to more than the number of turns of the coil 34 wound around core coil section 33b of a core 33. Specifically, the 40,000 turn coil of 60,000 turns and the coil 34 is carried out for the coil 24.

[0057] The edge of each of these coils 24 and 34 is connected to the coil lead substrates 25 and 35 formed on magnetic flow section 23a of cores 23 and 33, and 33a. In addition, the coil of each coils 24 and 34 is carried out in this direction to the direction which goes [ as opposed to / that is, / the coil lead substrates 25 and 35 ] to the core stator sections 22 and 32 from the magnetic flow sections 23a and 33a of cores 23 and 33.

[0058] For this reason, as the end-winding children 25a and 25b of the lead substrates 25 and 35, and 35a and 35b are shown also in the circuit diagram of drawing 5 , Terminals 25b and 35b are connected, each coils 24 and 34 are connected to a serial, and Terminals 25a and 35a are connected to the pressure-up rectifier circuit 50 which consists of a pressure-up capacitor 51 and diodes 52 and 53. Thereby, through the pressure-up rectifier circuit 50, it is rectified, the capacitor 54 for smooth charges, and the ac output from coils 24 and 34 is supplied to the pressure up and IC55 which performs governing control etc. from a capacitor 54.

[0059] In addition, each terminals 25b and 35b connected are arranged on both sides of terminal 35a, and if it remains as it is, it is hard to connect them. For this reason, the double-sided substrate is used for the circuit board (not shown) in which said pressure-up rectifier-circuit 50 grade is formed with this operation gestalt.

[0060] Thus, since the direction of a coil of coils 24 and 34 is in agreement to the direction of the magnetic flux which flows each cores 23 and 33 by connecting the terminals 25b and 35b of each coils 24 and 34, the ac output to which the electromotive force in each coils 24 and 34 was added is supplied to the pressure-up rectifier circuit 50.

[0061] Thus, in order to add each external magnetic field in this direction to each coils 24 and 34 arranged in parallel if an external magnetic field joins each coils 24 and 34 when the constituted electronics control type machine clock is being used, to the direction of a coil of each coils 24 and 34, hard flow will be mutually joined by the external magnetic field. For this reason, since it works so that the electromotive force generated with each coils 24 and 34 may be mutually negated by the external magnetic field, that effect is mitigable.

[0062] Especially, like this operation gestalt, if an external magnetic field H is added from a direction as shown in drawing 1 when the location of Rota 12 carries out eccentricity and is arranged, much magnetic flux will flow by the stator section 32 33, i.e., core, side by difference of the area of the core stator sections 22 and 32. Under the present circumstances, with this operation gestalt, since the number of turns of the coil 34 wound around the core 33 are made below into the number of turns of the coil 24 of a core 23, the electromotive force by the external magnetic field by the side of a coil 24 becomes large, and a difference with the electromotive force by the external magnetic field by the side of a coil 34 becomes small. In each coils 24 and 34, since there is almost no difference in the electromotive force by the external magnetic field which works so that it may negate each other, the effect of an external magnetic field is mitigated.

[0063] According to such this operation gestalt, there is the following effectiveness.

[0064] 1) Since the number of turns of the coil 24 by the side of the core 23 with a small area of the core stator section 22 were set up more than the number of turns of the coil 34 by the side of the core 33 with a large area of the stator section 32 Even if a difference appears in the number of magnetic flux which flows each cores 23 and 33 by the external magnetic field according to the difference of the area of the core stator sections 22 and 32 A difference hardly appears in the magnitude of the electromotive force by the external magnetic field in each coils 24 and 34, but since each of such electromotive force is negated mutually, it can mitigate the effect of an external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise.

[0065] 2) Since the magnetic noise by the external magnetic field is mitigable, it becomes unnecessary to prepare \*\*\*\*-proof in movement components, such as a dial 2a part of an electronics control type machine clock, or to use the ingredient which has \*\*\*\*\*-proof in exterior parts. For this reason, while the miniaturization and thin-shape-izing of a part and a movement to which \*\*\*\*-proof etc. becomes unnecessary while cost is mitigable are realizable, since arrangement of each part article etc. is not restricted to exterior parts, the degree of freedom of a design increases, and the electronics control type machine clock excellent in design nature, manufacture effectiveness, etc. can be offered.

[0066] 3) Since the effect of a magnetic noise is small, an output wave can become a sine wave mostly, an output wave can be easily detected by dividing and carrying out binarization with a moderate threshold etc., and the rotational frequency of Rota 12 etc. can be detected easily. Therefore, the clock using the output wave of a generator is easily [correctly and] controllable.

[0067] 4) Since each core stator sections 22 and 32 are considered as a two-sheet laminating type and are carrying out direct continuation Since leakage flux decreases and also the level difference is attached with constituting a superposition part from a plate of one sheet While also being able to make good positioning nature at the time of assembly, the height level of the lead substrates 25 and 35 can be doubled, the configuration of connecting each lead substrates 25 and 35 to the circuit board further becomes easy, and cost can be reduced.

[0068] Drawing 6 shows the 2nd operation gestalt of this invention. In addition, in each following operation gestalt, while illustrating only the coil block part used as the description, the same sign is given to the same configuration member as said operation gestalt, and those explanation is simplified or omitted.

[0069] Rota 12 is arranged on each coil 24 and the boundary line L which met among 34, and the 2nd operation gestalt is constituted so that the core stator sections 22 and 32 may serve as bilateral symmetry to said boundary line L. Moreover, let the number of turns of each coils 24 and 34 be the same number. Here, since the number of turns of a coil are usually the unit of tens of thousands turns, even the difference in the error of extent to which number of turns can disregard the same number not only from the case of the same number but from the whole coil completely, for example, hundreds turn extent, is included.

[0070] The direction of a volume of each coils 24 and 34 to the coil lead substrates 25 and 35 (cores 23 and 33), connection of the terminal in each other lead substrates 25 and 35, etc. are the same as said 1st operation gestalt.

[0071] according to such this operation gestalt, the core stator sections 22 and 32 of 5 same configuration be arrange to bilateral symmetry, and since the number of winding of each coils 24

and 34 be the same , by same number flow and this , the magnetic flux by the external magnetic field can cancel the effect of the magnetic noise accord the inside of two coils 24 and 34 to an external magnetic field , and can form an electronics control type machine clock strong against a magnetic noise . Therefore, said 2 or 3 effectiveness can also be done so.

[0072] 6) Since the core stator sections 22 and 32 are the same configurations, the same components can be used as a front flesh side, and can also be assembled, components can be shared, and the number of components can be reduced. For this reason, a manufacturing cost and components cost can be reduced and handling can also be made easy.

[0073] Drawing 7 shows the 3rd operation gestalt of this invention.

[0074] The point of the 1st edge (core stator sections 22 and 32) in which, as for the 3rd operation gestalt, Rota 12 was established in the cores 23 and 33 of each coils 24 and 34 that the surface ratio of the 2nd edge (core MAG flow sections 23a and 33a) of the opposite side is in inverse proportion to the surface ratio of the core stator sections 22 and 32 by the side of the 1st [ of each of said cores 23 and 33 ] edge is the description.

[0075] That is, if the surface ratio of the core stator sections 22 and 32 is 1:2, surface ratio of the core MAG flow sections 23a and 33a will be set to about 2:1, and if the surface ratio of the core stator sections 22 and 32 is 2:3, surface ratio of the core MAG flow sections 23a and 33a is set to about 3:2.

[0076] In such this operation gestalt, an external magnetic field affects not only the core stator sections 22 and 32 but the magnetic flow sections 23a and 33a. For this reason, in stator section 32 part, in a magnetic flow section 33a part, since area is small, much magnetic flux flows to a coil 24 side conversely, and, thereby, each coil 24 and the amount of magnetic flux which flows the inside of 34 are equated [ an external magnetic field ] by the coil 34 side with which much magnetic flux flows since area is large.

[0077] Therefore, since according to this operation gestalt 7 each coil 24 and the amount of magnetic flux which flows the inside of 34 can be equated and the electromotive force by the magnetic flux of an external magnetic field can be negated mutually, the effect of the magnetic noise by the external magnetic field can be canceled, and an electronics control type machine clock strong against a magnetic noise can be formed. Therefore, said 2 or 3 effectiveness can also be done so.

[0078] Drawing 8 shows the 4th operation gestalt of this invention.

[0079] theta 1 is made larger than 90 degrees whenever [ to said each coil 24 of the line L1 which connects with the 4th operation gestalt the outside notch 41 formed in the periphery side of the core stator sections 22 and 32 among notches 41 and 42 outside two formed in the core stator sections 22 and 32, and the core of Rota 12, and the boundary line L between 34 / tilt-angle ]. For this reason, the periphery part of the core stator section 22 is extended at the core stator section 32 side. In addition, other configurations are the same as that of said operation gestalt.

[0080] Since 8 core stator section 22 is extended in such this operation gestalt at the stator section 32 side, When an external magnetic field H is especially added from the direction of [ around about 130 degrees ] to the boundary line L with the large effect difference of an external magnetic field in each coils 24 and 34 The difference of the magnetic flux which becomes easy to incorporate the part to the core stator section 22 side, and flows in each coils 24 and 34 can become small, can cancel the effect of the magnetic noise by the external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise. Therefore, said 2 or 3 effectiveness can also be done so.

[0081] Drawing 9 shows the 5th operation gestalt of this invention.

[0082] The core stator section 22 is equipped with extension 22a extended to the location where the distance S1 from a boundary line L becomes longer than the distance S2 to the stator section 32 with the 5th operation gestalt. In addition, what is necessary is for a continuous line to show the magnitude and the configuration of this extension 22a to drawing 9 , and for a NI point lead line to show them, and just to set them up in consideration of balance with the area of the stator section 32, a configuration, etc.

[0083] Since the core stator section 22 is extended to the long distance rather than the stator section 32 to the 9 boundary line L in such this operation gestalt, When an external magnetic

field H is especially added from the direction of [ around about 130 degrees ] to the boundary line L with the large effect difference of an external magnetic field in each coils 24 and 34. The difference of the magnetic flux which becomes easy to incorporate the part to the core stator section 22 side, and flows in each coils 24 and 34 can become small, can cancel the effect of the magnetic noise by the external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise. Therefore, said 2 or 3 effectiveness can also be done so.

[0084] Drawing 10 shows the 6th operation gestalt of this invention.

[0085] With the 6th operation gestalt, two coils 24 and 34 carry out a predetermined include-angle inclination in parallel and mutually, and are arranged. That is, the core 23 of the coil block 21 inclines at the include angle  $\theta_2$  of about 10 degrees to the core 33 of the coil block 31.

[0086] Since ten coils 24 incline to the coil 34 in such this operation gestalt, When an external magnetic field H is especially added from the direction of [ around about 130 degrees ] to the boundary line L with the large effect difference of an external magnetic field in each coils 24 and 34, in order that the direction of the core 23 of a coil 24 may approach in the direction of line of magnetic force of the external magnetic field H, The difference of the magnetic flux which sink comes to be easy of a part of external magnetic field H also to a coil 24 side, and flows in each coils 24 and 34 can become small, can cancel the effect of the magnetic noise by the external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise. Therefore, said 2 or 3 effectiveness can also be done so.

[0087] Drawing 11 shows the 7th operation gestalt of this invention.

[0088] With the 7th operation gestalt, like the 6th operation gestalt, two coils 24 and 34 carry out a predetermined include-angle inclination in parallel and mutually, and are arranged. That is, the core 33 of the coil block 31 inclines at the include angle  $\theta_2$  of about 15 degrees to the core 23 of the coil block 21.

[0089] Since 11 coils 34 incline to the coil 24 also in such this operation gestalt, When an external magnetic field H is especially added from the direction of [ around about 130 degrees ] to the boundary line L with the large effect difference of an external magnetic field in each coils 24 and 34, in order that a coil 34 may approach in the direction which intersects perpendicularly in the direction of line of magnetic force of the external magnetic field H, The difference of the magnetic flux which becomes easy to flow to a coil 24 side, and flows in each coils 24 and 34 can become small, and an external magnetic field H can cancel the effect of the magnetic noise by the external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise. Therefore, said 2 or 3 effectiveness can also be done so.

[0090] In addition, this invention is not limited to each above-mentioned operation gestalt, and the deformation in the range which can attain the purpose of this invention, amelioration, etc. are included in this invention.

[0091] For example, although the effect of the magnetic noise by the external magnetic field was decreased by adjusting the number of turns of coils 24 and 34 with said 1st operation gestalt, the effect of a magnetic noise may be decreased by controlling the amount of maximum saturation magnetic flux of cores 23 and 33, permeability, etc.

[0092] What is necessary is just to specifically make the amount of maximum saturation magnetic flux of a core 23 larger than the amount of maximum saturation magnetic flux of a core 33. In this case, while is small, even if the area of the core stator section 22 is a core 23 side, balance with the magnetic flux which magnetic flux becomes easy to flow and flows by this to the core 33 side of another side where the area of the core stator section 32 is large becomes good, the difference of the magnetic flux which flows in each coils 24 and 34 becomes small, and it can decrease the effect of the magnetic noise by the external magnetic field.

[0093] Moreover, a core 23 may be formed with the quality of the material with permeability higher than the quality of the material of a core 33. Also in this case, while is small, even if the area of the core stator section 22 is a core 23 side, balance with the magnetic flux which magnetic flux becomes easy to flow and flows by this to the core 33 side of another side where the area of the core stator section 32 is large is improved, the difference of the magnetic flux which flows in each coils 24 and 34 becomes small, and it can decrease the effect of the magnetic noise by the



external magnetic field.

[0094] Furthermore, although formed in the 2nd [ of the opposite side ] edge side (a core MAG flow section 23a side, the 33a side) with said each operation gestalt with the 1st edge (the core stator section 22 side, 32 sides) where the coil lead substrates 25 and 35 were formed in Rota 12 in each cores 23 and 34, you may prepare in said 1st edge side. However, it is desirable at the point that the way formed in the 2nd edge side can form the coil lead substrates 25 and 35 in core MAG flow section 23a and 33a parts in piles, can shorten the die length of a magnetic circuit at this rate, and can decrease in number iron loss.

[0095] Moreover, with said operation gestalt, although each coil lead substrates 25 and 35 were formed in the same edge of each cores 23 and 33, one substrate of each coil lead substrates 25 and 35 may be formed in a 1st [ of each cores 23 and 33 ] edge side, and the substrate of another side may be formed in a 2nd edge side. In this case, even if it is winding each coils 24 and 34 in this direction on the basis of the 2nd edge, each adjoining terminal (for example, terminals 25b and 35a) can be connected, and each coils 24 and 34 can be connected to a serial. For this reason, since the direction of a volume of the coils 24 and 34 to each cores 23 and 33 is the same while being able to use a single-sided board for the circuit board and being able to reduce cost, the effectiveness of a coil activity can be improved and manufacture effectiveness can also improve.

[0096] Moreover, the direction of a volume of the coils 24 and 34 to each cores 23 and 33 may be made the same, and only the connection to the coil lead substrate 25 of one coil 24 may be made to cross between two coils 24 and 34, as shown in drawing 12 (cross). Also in this case, since each adjoining terminal (for example, terminals 25b and 35a) can be connected, each coils 24 and 34 can be connected to a serial and a single-sided board can be used as the circuit board, cost can be reduced.

[0097] Furthermore, with said each operation gestalt, although each coils 24 and 34 were wound in this direction to each coil lead substrates 25 and 35 (each cores 23 and 33), you may wind around an opposite direction mutually to each substrates 25 and 35. In this case, since each substrates 25 and 35 are arranged at the same edge of each cores 23 and 33, and the terminals which adjoin mutually are connected and each coils 24 and 34 can be connected to a serial, there is an advantage which can arrange each substrates 25 and 35 at the same edge of cores 23 and 33, and can use a single-sided board as the circuit board.

[0098] Moreover, the laminating of each cores 23 and 33 made into the two-layer core in the magnetic flow sections 23a and 33a of each cores 23 and 33 as shown in drawing 13 may be carried out as it is, and they may be constituted. In this case, in order to make connection with the circuit board 61 easy, the spacer 60 which arranges the height level of each coil lead substrates 25 and 35 is arranged. Although the part and components mark for which a spacer 60 is needed increase with such a configuration, the two-layer core which constitutes cores 23 and 33 can be formed in the same configuration, and there is an advantage which can lessen a components class.

[0099] Furthermore, what is necessary is for the configuration of the coil blocks 21 and 31 in this invention, a configuration, etc. to really which is not divided as a stator arranged to Rota 12 perimeter like the conventional example shown not only in said operation gestalt but in drawing 14 use a stator, and just to set up the concrete structure etc. suitably in operation.

[0100] Moreover, said each operation gestalt may be combined suitably. For example, in said 1st operation gestalt, the amount of maximum saturation magnetic flux and permeability of not only the number of turns of coils 24 and 34 but the cores 23 and 33 may be adjusted. Furthermore, also in said 2-7th operation gestalt, the number of turns of each coils 24 and 34 may be adjusted, or the amount of maximum saturation magnetic flux and permeability of cores 23 and 33 may be adjusted.

[0101]

[Effect of the Invention] As more than stated, when two or more coils are prepared according to the electronics control type machine clock of this invention, with devising arrangement of each coil, the configuration of a stator, area, the number of turns of a coil, etc., the effect of the magnetic noise by the external magnetic field which joins each coil can be mitigated, and an electronics control type machine clock strong against a magnetic noise can be formed.



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## TECHNICAL FIELD

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[Field of the Invention] This invention relates to amelioration of the generator used for control power while it transforms mechanical energy in case a spiral spring opens into electrical energy in part, operating as a driving source and transforms especially mechanical energy into electrical energy about the electronics control type machine clock which a roll control means is operated with this power, and controls a rotation period.

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## PRIOR ART

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[Description of the Prior Art] What was indicated by JP,8-5758,A is known as an electronics control type machine clock which drives correctly the guide fixed to a wheel train, and displays time of day correctly by controlling the current value which mechanical energy in case a spiral spring opens is transformed into electrical energy with a generator, and a roll control means is operated with the electrical energy, and flows in the coil of a generator.

[0003] Drawing 14 and 15 are the top views and sectional views of a clock which were indicated by this official report.

[0004] In drawing 14 and 15, it accelerates the rotational motion force from the barrel vehicle 1 which built in the spiral spring through the wheel train which consists of No. 2 vehicle vehicle [ of No. 8 or 4 ] vehicle [ of No. 9 or 5 ] a vehicle 11 of No. 10 or 6 of No. 7 or 3 supported by the cope plate 2 and the wheel train carrier 3, and it is coordinated with a generator 20.

[0005] A generator 20 is structure similar to the step motor for a drive of the conventional cell drive type electronic clock, and consists of Rota 12, a stator 150, and coil block 160.

[0006] Rota 12 attaches Rota magnet 12a and Rota circle-of-inertia plate 12c in the circumference of the shaft of Rota kana 12b which coordinates and rotates on the No. 6 vehicle 11 at one.

[0007] A stator 150 carries out the coil of the stator-coil 150b of 40,000 turns to stator object 150a.

[0008] The coil block 160 carries out the coil of the coil 160b of 110,000 turns to core 160a. Here, stator-coil 150b and coil 160b are connected to the serial so that the output voltage which applied each generation-of-electrical-energy electrical potential difference may come out.

[0009] And this generator 20 supplies electric power to the electronic circuitry equipped with the crystal oscillator through the capacitor which does not illustrate the power obtained by rotation of Rota 12, and delivery, consequently a wheel train always rotate the control signal of the Rota rotation with a fixed rotational speed in this electronic circuitry according to that damping force according to rotation detection and reference frequency of Rota in a coil.

[0010] Such an electronics control type machine clock has an unnecessary motor for a movement drive, in order to make a spiral spring into the source of power for the drive of a guide, and it has the description that there are few components mark and it is cheap. The clock was also able to be operated with little input energy that what is necessary is just to generate slight electrical energy required to operate an electronic circuitry moreover.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] As more than stated, when two or more coils are prepared according to the electronics control type machine clock of this invention, with devising arrangement of each coil, the configuration of a stator, area, the number of turns of a coil, etc., the effect of the magnetic noise by the external magnetic field which joins each coil can be mitigated, and an electronics control type machine clock strong against a magnetic noise can be formed.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, if it was in the generator 20 of said structure, the technical problem on the structure described below and an electromagnetic characteristic

occurred.

[0012] That is, by the electronics control type machine clock, in order to incorporate a generator 20 in a small tooth space called a wrist watch and to acquire generation-of-electrical-energy capacity sufficient also with the small generator 20, the number of turns of a coil needed to be made [ many ]. On the other hand, since it is necessary to avoid connection with other components, such as a wheel train, while having arranged Rota 12 to the clock inside rather than each stator 150 and the coil block 160, the number of turns of coil 150b of the inside stator 150 were made fewer than the number of turns of coil 160b of the coil block 160, and the tooth space of \*\*\*\* was secured.

[0013] For this reason, although sufficient thing was obtained in the field of generation-of-electrical-energy induced voltage or space efficiency, there was a problem of rotation detection of Rota becoming impossible in response to the effect of an external magnetic field.

[0014] That is, as easiest method of detecting the Rota rotational frequency, the generation-of-electrical-energy wave is detected, and there is the approach of carrying out binarization of this. However, when the area of the stator part around Rota is greatly different especially with each coil block, a clock was brought to the location where an external magnetic field exists for this reason and an external alternating current field occurred, the external alternating current field became a noise, the generation-of-electrical-energy induced voltage of a coil became the complicated Yamagata wave, and detection was difficult for it for this reason, since the location of Rota was partial to each coil as above-mentioned.

[0015] Although \*\*\*\*-proof was prepared in the movement components of a clock or using the ingredient which has \*\*\*\*\*-proof in exterior parts was also considered in order to have reduced the magnetic noise by such external magnetic field, there was a problem that a miniaturization and thin-shape-izing of the part which cost becomes high and prepares \*\*\*\*-proof, and a movement were difficult.

[0016] The purpose of this invention is to offer the electronics control type machine clock which effect of an external magnetic field can be lessened, and can reduce cost.

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## MEANS

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[Means for Solving the Problem] The electronics control type machine clock indicated by claim 1 of this invention The source of mechanical energy, and the wheel train which tells the torque from said source of mechanical energy, Rota rotated with said wheel train, and the coil which changes the flux reversal of this Rota into electrical energy, By controlling the rotation period of said Rota by the electronic circuitry which has, is constituted and drives the core around which this coil is wound with said electrical energy Two or more said coils are prepared in the electronics control type machine clock it was made to govern applying braking to a wheel train. Two or more of these coils While being arranged in parallel mutually and connecting each coil to the serial, it is characterized by being arranged at a coil side and the number of turns of the coil of the one side of this being more than number of turns of the coil of another side, while [ to the boundary line to which, as for said Rota, that medial axis met between each coil ].

[0018] In addition, it means connecting so that the electromotive force in each coil may be added as each coil is connected to a serial. That is, the magnetic flux which changes with rotation of Rota passes along the inside of the magnetic circuit which consists of a core around which each coil was wound. For this reason, in the coil each other arranged in parallel, although magnetic flux flows toward an opposite direction mutually, each coil is connected to the serial in this case, so that the electromotive force in each coil may be added.

[0019] On the other hand, in order that an external magnetic field may work in this direction to the core around which each coil was wound, the electromotive force by the external magnetic field in each coil serves as an opposite direction mutually, and it works so that it may negate each other. And since it is arranged at a coil side and the distance from each coil to Rota differs in this invention in while [ to the boundary line to which the medial axis met / Rota / between each coil ], For example, two coil blocks which consist of winding a coil around said core coil section of

the core which consists of the core stator section, the core coil section, and the core MAG flow section are prepared. When said Rota is arranged and constituted between the core stator sections of each coil block, area becomes large to the core stator section by the side of one coil (coil block), and, as for the core stator section by the side of the coil of another side (coil block), the part and an external magnetic field become easy to flow. For this reason, by this invention, by carrying out the number of turns of one coil to more than the coil of another side, even if the flow of an external magnetic field is small, electromotive force by that external magnetic field is enlarged, and the magnetic noise can negate the electromotive force in a coil more and according to an external magnetic field while many said external magnetic fields flow can be decreased.

[0020] The electronics control type machine clock of this invention according to claim 2 is characterized by for the medial axis of Rota having arranged Rota so that it may become the boundary line top which met between each coil which each other has been arranged in parallel and connected to the serial, and making the same number the number of turns of each of said coil.

[0021] According to this invention, since each coil and a core are arranged to a boundary line, i.e., \*\* Rota, at bilateral symmetry, the effect of an external magnetic field can also become the same with each coil, and since the number of turns of each coil are the same number, the electromotive force in each coil by the external magnetic field can be negated mutually, and a magnetic noise can be decreased.

[0022] The electronics control type machine clock of this invention according to claim 3 While arranges said Rota to a coil side to the boundary line to which the medial axis met between each coil. With the 1st edge in which Rota was established in the core around which each coil was wound, the surface ratio of each magnetic flow section (core MAG flow section) prepared in the 2nd edge of the opposite side It is characterized by setting up so that it may be in inverse proportion to the surface ratio of the stator (core stator section) prepared in the 1st [ of each of said core ] edge side.

[0023] An external magnetic field is added also in the magnetic flow section of not only a stator part but each core. Therefore, by making while being small and smaller than the magnetic flow section by the side of a coil (coil block side) area of the magnetic flow section by the side of the coil of another side where the area of a stator is large (coil block side), the area of a stator can make small the difference of the effect of the external magnetic field between each coil, can suppress the effect of an external magnetic field, and can decrease a magnetic noise.

[0024] The electronics control type machine clock of this invention according to claim 4 is characterized by making larger than the core wound around the coil of another side the amount of maximum saturation magnetic flux of the core around which it has arranged to the coil side and the coil of one of these was wound for while [ to the boundary line to which that medial axis met between each coil ] in said Rota.

[0025] Since one core has the amount of maximum saturation magnetic flux larger than the core around which the coil of another side was wound, magnetic flux becomes easy to flow and it can pass more magnetic flux. Therefore, balance with the magnetic flux which while is small, magnetic flux becomes easy to flow even if it is a core side, and flows by this to the core side of another side where the area of a stator (core stator section) is large can become good, the area of a stator (core stator section) can make small the difference of the effect of the external magnetic field between each coil, the effect of an external magnetic field can be suppressed, and a magnetic noise can be decreased.

[0026] The electronics control type machine clock of this invention according to claim 5 is characterized by constituting the core around which it has arranged to the coil side and the coil of one of these was wound for while [ to the boundary line to which that medial axis met between each coil ] in said Rota from the quality of the material with permeability higher than the core wound around the coil of another side.

[0027] Since the permeability of the core around which one coil was wound is large, magnetic flux becomes easy to flow and more magnetic flux can be passed. For this reason, a difference with the electromotive force in the coil of another side along which magnetic flux passes can become small, can make small the difference of the effect of the external magnetic field between

each coil, can suppress the effect of an external magnetic field, and can decrease a magnetic noise.

[0028] The electronics control type machine clock of this invention according to claim 6 While forming an outside notch in the stator prepared in the 1st edge side in which Rota was established in the core around which it has arranged to the coil side and each coil was wound for while [ to the boundary line to which the medial axis met between each coil ] in said Rota With one [ said ] coil, it is characterized by forming in the opposite side to the line which intersects perpendicularly with said boundary line the outside notch formed in the periphery side of the stator to said boundary line, and passes along the Rota core.

[0029] with the coil of an outside [ line / , i.e. , the line whose crossover include angle to a boundary line be 90 degrees , / the line by which a boundary line and an outside notch cross at right angles and pass along the Rota core ] , one [ i.e. , ] , if form in the opposite side , the stator ( core stator section ) area of one coil can become that much large , can make small the difference of the effect of the external magnetic field between each coil , can suppress the effect of an external magnetic field , and can decrease a magnetic noise .

[0030] The electronics control type machine clock of this invention according to claim 7 While arranges said Rota to a coil side to the boundary line to which the medial axis met between each coil. It is characterized by having extended the stator by the side of one [ said ] coil to the location where the distance from said boundary line becomes long rather than the stator by the side of the coil of another side among the stators prepared in the 1st edge side in which Rota was established in the core around which each coil was wound.

[0031] Since the stator by the side of one coil (core stator section) is extended to the long distance rather than the stator by the side of the coil of another side (core stator section), the stator area by the side of the part and one coil can become large, can make small the difference of the effect of the external magnetic field between each coil, can suppress the effect of an external magnetic field, and can decrease a magnetic noise.

[0032] The electronics control type machine clock of this invention according to claim 8 is formed for two or more said coils, and it is characterized by carrying out a predetermined include-angle inclination and arranging one coil to the coil of another side, among two or more of these coils.

[0033] for example, if the coil (coil block) of 1 in all side is adjusted to the include angle of an external magnetic field with the biggest effect to the coil (getting it blocked -- a coil block) of another side whenever [ tilt-angle / which the external magnetic field tends to influence ] , the difference of the effect of the external magnetic field between each coil can be made small, the effect of an external magnetic field can be suppressed, and a magnetic noise can be decreased.

[0034] In each above electronics control type machine clock, since a magnetic noise can be decreased, \*\*\*\*-proof can not necessarily be prepared, or it becomes unnecessary to use an ingredient with \*\*\*\*\*-proof, and cost can be reduced, and a miniaturization and thin-shape-izing of a movement can also be realized easily.

[0035] Moreover, as for the direction of a volume of each of said coil, in each above electronics control type machine clock, it is desirable to be set up in this direction.

[0036] If the direction of a volume over the core of a coil (for example, the direction of a volume over the direction which goes to the core stator section from the magnetic flow section of a core) is the same, in case a coil is twisted around a core, in each coil, it can twist by the same approach, and manufacture effectiveness can be improved.

[0037] Moreover, as for the coil lead substrate with which the terminal of each of said coil was prepared, it is desirable to be prepared in either same edge side of the 1st edge (for example, core stator section) in which Rota was established in the core of each coil, and the 2nd edge (for example, core MAG flow section) of the opposite side of the edge, and it is desirable to be especially prepared in the 2nd [ of a core / said ] edge side, respectively.

[0038] If the coil lead substrate is formed in the same edge side in each core, the wiring processing from a coil lead substrate becomes easy, and wiring structure can be simplified. If it prepares in the 2nd edge side which is the opposite side in Rota especially, wiring of Rota, a wheel train, etc. and a coil lead substrate does not interfere, but wiring structure can improve further. Furthermore, since the die length of a magnetic circuit can be shortened, iron loss can be

decreased.

[0039] Moreover, the connection of one [ said ] coil end to the coil lead substrate formed in the core edge around which one [ said ] coil was wound may cross (cross). When two coil blocks were used, the connection to the lead substrate of the coil end in one coil block was crossed and each coil block is arranged in juxtaposition, each coil can be connected to a serial by connecting the adjoining terminals of the end-winding child of the lead substrate with which connection of the crossing coil end was carried out, and the end-winding child of the lead substrate in the coil block of another side which does not cross. For this reason, a single-sided board can be used as the circuit board, and cost can be reduced.

[0040] Moreover, with the 1st edge in which Rota was established in the core by which the coil lead substrate with which it prepared in the 1st edge in which Rota was established in the core by which the coil lead substrate with which the terminal of one [ said ] coil was prepared was wound around the coil, and the terminal of the coil of another side was prepared was wound around the coil, you may prepare in the 2nd edge of the opposite side.

[0041] Also in this case, since the terminals which adjoin in each coil can be connected in case each coil rolled in this direction is connected to a serial, a single-sided board can be used as the circuit board, and cost can be reduced.

[0042] Furthermore, the direction of a volume of each of said coil may be mutually set as an opposite direction to a core. In this case, wiring structure can be simplified, while being able to use a single-sided board as the circuit board and being able to reduce cost, since the terminals which adjoin with each of that lead substrate can be connected even if it arranges each lead substrate to the same terminal side of each coil in case each coil is connected to a serial.

[0043]

[Embodiment of the Invention] Below, the operation gestalt of this invention is explained based on a drawing.

[0044] Drawing 1 is the top view showing the important section of the electronics control type machine clock of the 1st operation gestalt of this invention, and drawing 2 and 3 are the sectional view.

[0045] The electronics control type machine clock is equipped with the barrel vehicle 1 which consists of spiral spring 1a, barrel gearing 1b, barrel truth 1c, and 1d of barrel lids. As for spiral spring 1a, barrel gearing 1b and an inner edge are fixed to barrel truth 1c for an outer edge. Barrel truth 1c is supported by a cope plate 2 and the wheel train carrier 3, and it is being fixed with the angle hole screw 5 so that it may rotate by the angle hole vehicle 4 and one.

[0046] Although the angle hole vehicle 4 is rotated clockwise, \*\* which is not illustrated has geared with \*\* so that it may not rotate counterclockwise. In addition, since the method of rotating the angle hole vehicle 4 clockwise and rolling spiral spring 1a is the same as that of the automatic volume of a machine clock, or a \*\*\*\* device, explanation is omitted.

[0047] It accelerates 7 times and rotation of barrel gearing 1b is 6.4 one by one to the No. 2 vehicle 7. It double-accelerates. To the No. 3 vehicle 8 9.375 To the No. 4 vehicle 9, it accelerates 3 times, and it accelerates 10 times, each \*\*\*\* 7-11 which it accelerates 10 times to the No. 6 vehicle 11, and serves as an accelerating wheel train to Rota 12 is minded [ it double-accelerates, and ] to the No. 5 vehicle 10, and it is a total of 126,000. It accelerates twice.

[0048] The second hand to which the minute hand to which cylinder kana 7a performs a time stamp to cylinder kana 7a, and which is not illustrated performs a time stamp in the No. 4 vehicle 9 and which is not illustrated is being fixed to the No. 2 vehicle 7, respectively. Therefore, what is necessary is just to control Rota 12 to rotate by 5rps, in order to rotate the No. 2 vehicle 7 by 1rph and to rotate the No. 4 vehicle 9 by 1rpm. Barrel gearing 1b at this time is set to 1/7rph.

[0049] Moreover, disc-like dial 2a is attached in the cope plate 2.

[0050] This electronics control type machine clock is equipped with the generator 20 which consists of Rota 12 and coil blocks 21 and 31. Rota 12 consists of Rota magnet 12a and Rota kana 12b.

[0051] The coil blocks 21 and 31 carry out the coil of the coils 24 and 34 to cores (core) 23 and 33; and are constituted. The core stator sections 22 and 32 which adjoin Rota 12 and are arranged, the core coil sections 23b and 33b around which said coils 24 and 34 are wound, and the core



MAG flow sections 23a and 33a connected mutually are formed in one, and cores 23 and 33 are constituted.

[0052] Said each cores 24 and 33 [ 23 and ] 34 of each other, i.e., each coils, are arranged in parallel. And said Rota 12 is arranged at the coil 24 side as opposed to the boundary line L to which the medial axis met the 1st [ of each cores 23 and 33 ] edge side (the core stator section 22 side, 32 sides) between each coil 24 and 34. that is, each part article can be efficiently arranged in dial 2a -- as -- said Rota 12 -- the inner circumference side of dial 2a -- getting it blocked -- it is arranged at the coil 24 side.

[0053] For this reason, as for the core stator section 32 by the side of a periphery, area is greatly formed rather than the core stator section 22 by the side of inner circumference.

[0054] In addition, in the 2nd [ of each cores 23 and 33 ] edge side (core MAG flow sections 23a and 33a), it is connected mutually and cores 23 and 33 form the annular magnetic circuit.

[0055] As cores 23 and 33 are shown also in drawing 4, the two-sheet laminating of the metal plate is carried out, and it is constituted, and let core MAG flow section 23a and 33a parts be only the plates of one sheet. Thereby, the core MAG flow sections 23a and 33a are being fixed to the cope plate 2 on the screw which it is made to become flat and penetrates both, when it piles up.

[0056] The number of turns of the coil 24 wound around core coil section 23b of a core 23 is carried out to more than the number of turns of the coil 34 wound around core coil section 33b of a core 33. Specifically, the 40,000 turn coil of 60,000 turns and the coil 34 is carried out for the coil 24.

[0057] The edge of each of these coils 24 and 34 is connected to the coil lead substrates 25 and 35 formed on magnetic flow section 23a of cores 23 and 33, and 33a. In addition, the coil of each coils 24 and 34 is carried out in this direction to the direction which goes [ as opposed to / that is, / the coil lead substrates 25 and 35 ] to the core stator sections 22 and 32 from the magnetic flow sections 23a and 33a of cores 23 and 33.

[0058] For this reason, as the end-winding children 25a and 25b of the lead substrates 25 and 35, and 35a and 35b are shown also in the circuit diagram of drawing 5, Terminals 25b and 35b are connected, each coils 24 and 34 are connected to a serial, and Terminals 25a and 35a are connected to the pressure-up rectifier circuit 50 which consists of a pressure-up capacitor 51 and diodes 52 and 53. Thereby, through the pressure-up rectifier circuit 50, it is rectified, the capacitor 54 for smooth charges, and the ac output from coils 24 and 34 is supplied to the pressure up and IC55 which performs governing control etc. from a capacitor 54.

[0059] In addition, each terminals 25b and 35b connected are arranged on both sides of terminal 35a, and if it remains as it is, it is hard to connect them. For this reason, the double-sided substrate is used for the circuit board (not shown) in which said pressure-up rectifier-circuit 50 grade is formed with this operation gestalt.

[0060] Thus, since the direction of a coil of coils 24 and 34 is in agreement to the direction of the magnetic flux which flows each cores 23 and 33 by connecting the terminals 25b and 35b of each coils 24 and 34, the ac output to which the electromotive force in each coils 24 and 34 was added is supplied to the pressure-up rectifier circuit 50.

[0061] Thus, in order to add each external magnetic field in this direction to each coils 24 and 34 arranged in parallel if an external magnetic field joins each coils 24 and 34 when the constituted electronics control type machine clock is being used, to the direction of a coil of each coils 24 and 34, hard flow will be mutually joined by the external magnetic field. For this reason, since it works so that the electromotive force generated with each coils 24 and 34 may be mutually negated by the external magnetic field, that effect is mitigable.

[0062] Especially, like this operation gestalt, if an external magnetic field H is added from a direction as shown in drawing 1 when the location of Rota 12 carries out eccentricity and is arranged, much magnetic flux will flow by the stator section 32 33, i.e., core, side by difference of the area of the core stator sections 22 and 32. Under the present circumstances, with this operation gestalt, since the number of turns of the coil 34 wound around the core 33 are made below into the number of turns of the coil 24 of a core 23, the electromotive force by the external magnetic field by the side of a coil 24 becomes large, and a difference with the electromotive force



by the external magnetic field by the side of a coil 34 becomes small. In each coils 24 and 34, since there is almost no difference in the electromotive force by the external magnetic field which works so that it may negate each other, the effect of an external magnetic field is mitigated.

[0063] According to such this operation gestalt, there is the following effectiveness.

[0064] 1) Since the number of turns of the coil 24 by the side of the core 23 with a small area of the core stator section 22 were set up more than the number of turns of the coil 34 by the side of the core 33 with a large area of the stator section 32 Even if a difference appears in the number of magnetic flux which flows each cores 23 and 33 by the external magnetic field according to the difference of the area of the core stator sections 22 and 32 A difference hardly appears in the magnitude of the electromotive force by the external magnetic field in each coils 24 and 34, but since each of such electromotive force is negated mutually, it can mitigate the effect of an external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise.

[0065] 2) Since the magnetic noise by the external magnetic field is mitigable, it becomes unnecessary to prepare \*\*\*\*-proof in movement components, such as a dial 2a part of an electronics control type machine clock, or to use the ingredient which has \*\*\*\*\*-proof in exterior parts. For this reason, while the miniaturization and thin-shape-izing of a part and a movement to which \*\*\*\*-proof etc. becomes unnecessary while cost is mitigable are realizable, since arrangement of each part article etc. is not restricted to exterior parts, the degree of freedom of a design increases, and the electronics control type machine clock excellent in design nature, manufacture effectiveness, etc. can be offered.

[0066] 3) Since the effect of a magnetic noise is small, an output wave can become a sine wave mostly, an output wave can be easily detected by dividing and carrying out binarization with a moderate threshold etc., and the rotational frequency of Rota 12 etc. can be detected easily. Therefore, the clock using the output wave of a generator is easily [correctly and] controllable.

[0067] 4) Since each core stator sections 22 and 32 are considered as a two-sheet laminating type and are carrying out direct continuation Since leakage flux decreases and also the level difference is attached with constituting a superposition part from a plate of one sheet While also being able to make good positioning nature at the time of assembly, the height level of the lead substrates 25 and 35 can be doubled, the configuration of connecting each lead substrates 25 and 35 to the circuit board further becomes easy, and cost can be reduced.

[0068] Drawing 6 shows the 2nd operation gestalt of this invention. In addition, in each following operation gestalt, while illustrating only the coil block part used as the description, the same sign is given to the same configuration member as said operation gestalt, and those explanation is simplified or omitted.

[0069] Rota 12 is arranged on each coil 24 and the boundary line L which met among 34, and the 2nd operation gestalt is constituted so that the core stator sections 22 and 32 may serve as bilateral symmetry to said boundary line L. Moreover, let the number of turns of each coils 24 and 34 be the same number. Here, since the number of turns of a coil are usually the unit of tens of thousands turns, even the difference in the error of extent to which number of turns can disregard the same number not only from the case of the same number but from the whole coil completely, for example, hundreds turn extent, is included.

[0070] The direction of a volume of each coils 24 and 34 to the coil lead substrates 25 and 35 (cores 23 and 33), connection of the terminal in each other lead substrates 25 and 35, etc. are the same as said 1st operation gestalt.

[0071] according to such this operation gestalt, the core stator sections 22 and 32 of 5 same configuration be arrange to bilateral symmetry, and since the number of winding of each coils 24 and 34 be the same, by same number flow and this, the magnetic flux by the external magnetic field can cancel the effect of the magnetic noise accord the inside of two coils 24 and 34 to an external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise. Therefore, said 2 or 3 effectiveness can also be done so.

[0072] 6) Since the core stator sections 22 and 32 are the same configurations, the same components can be used as a front flesh side, and can also be assembled, components can be shared, and the number of components can be reduced. For this reason, a manufacturing cost

and components cost can be reduced and handling can also be made easy.

[0073] Drawing 7 shows the 3rd operation gestalt of this invention.

[0074] The point of the 1st edge (core stator sections 22 and 32) in which, as for the 3rd operation gestalt, Rota 12 was established in the cores 23 and 33 of each coils 24 and 34 that the surface ratio of the 2nd edge (core MAG flow sections 23a and 33a) of the opposite side is in inverse proportion to the surface ratio of the core stator sections 22 and 32 by the side of the 1st [ of each of said cores 23 and 33 ] edge is the description.

[0075] That is, if the surface ratio of the core stator sections 22 and 32 is 1:2, surface ratio of the core MAG flow sections 23a and 33a will be set to about 2:1, and if the surface ratio of the core stator sections 22 and 32 is 2:3, surface ratio of the core MAG flow sections 23a and 33a is set to about 3:2.

[0076] In such this operation gestalt, an external magnetic field affects not only the core stator sections 22 and 32 but the magnetic flow sections 23a and 33a. For this reason, in stator section 32 part, in a magnetic flow section 33a part, since area is small, much magnetic flux flows to a coil 24 side conversely, and, thereby, each coil 24 and the amount of magnetic flux which flows the inside of 34 are equated [ an external magnetic field ] by the coil 34 side with which much magnetic flux flows since area is large.

[0077] Therefore, since according to this operation gestalt 7 each coil 24 and the amount of magnetic flux which flows the inside of 34 can be equated and the electromotive force by the magnetic flux of an external magnetic field can be negated mutually, the effect of the magnetic noise by the external magnetic field can be canceled, and an electronics control type machine clock strong against a magnetic noise can be formed. Therefore, said 2 or 3 effectiveness can also be done so.

[0078] Drawing 8 shows the 4th operation gestalt of this invention.

[0079] theta 1 is made larger than 90 degrees whenever [ to said each coil 24 of the line L1 which connects with the 4th operation gestalt the outside notch 41 formed in the periphery side of the core stator sections 22 and 32 among notches 41 and 42 outside two formed in the core stator sections 22 and 32, and the core of Rota 12, and the boundary line L between 34 / tilt-angle ]. For this reason, the periphery part of the core stator section 22 is extended at the core stator section 32 side. In addition, other configurations are the same as that of said operation gestalt.

[0080] Since 8 core stator section 22 is extended in such this operation gestalt at the stator section 32 side, When an external magnetic field H is especially added from the direction of [ around about 130 degrees ] to the boundary line L with the large effect difference of an external magnetic field in each coils 24 and 34 The difference of the magnetic flux which becomes easy to incorporate the part to the core stator section 22 side, and flows in each coils 24 and 34 can become small, can cancel the effect of the magnetic noise by the external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise. Therefore, said 2 or 3 effectiveness can also be done so.

[0081] Drawing 9 shows the 5th operation gestalt of this invention.

[0082] The core stator section 22 is equipped with extension 22a extended to the location where the distance S1 from a boundary line L becomes longer than the distance S2 to the stator section 32 with the 5th operation gestalt. In addition, what is necessary is for a continuous line to show the magnitude and the configuration of this extension 22a to drawing 9 , and for a NI point lead line to show them, and just to set them up in consideration of balance with the area of the stator section 32, a configuration, etc.

[0083] Since the core stator section 22 is extended to the long distance rather than the stator section 32 to the 9 boundary line L in such this operation gestalt, When an external magnetic field H is especially added from the direction of [ around about 130 degrees ] to the boundary line L with the large effect difference of an external magnetic field in each coils 24 and 34 The difference of the magnetic flux which becomes easy to incorporate the part to the core stator section 22 side, and flows in each coils 24 and 34 can become small, can cancel the effect of the magnetic noise by the external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise. Therefore, said 2 or 3 effectiveness can also be done so.

[0084] Drawing 10 shows the 6th operation gestalt of this invention.

[0085] With the 6th operation gestalt, two coils 24 and 34 carry out a predetermined include-angle inclination in parallel and mutually, and are arranged. That is, the core 23 of the coil block 21 inclines at the include angle  $\theta_2$  of about 10 degrees to the core 33 of the coil block 31.

[0086] Since ten coils 24 incline to the coil 34 in such this operation gestalt, When an external magnetic field H is especially added from the direction of [ around about 130 degrees ] to the boundary line L with the large effect difference of an external magnetic field in each coils 24 and 34, in order that the direction of the core 23 of a coil 24 may approach in the direction of line of magnetic force of the external magnetic field H, The difference of the magnetic flux which sink comes to be easy of a part of external magnetic field H also to a coil 24 side, and flows in each coils 24 and 34 can become small, can cancel the effect of the magnetic noise by the external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise. Therefore, said 2 or 3 effectiveness can also be done so.

[0087] Drawing 11 shows the 7th operation gestalt of this invention.

[0088] With the 7th operation gestalt, like the 6th operation gestalt, two coils 24 and 34 carry out a predetermined include-angle inclination in parallel and mutually, and are arranged. That is, the core 33 of the coil block 31 inclines at the include angle  $\theta_2$  of about 15 degrees to the core 23 of the coil block 21.

[0089] Since 11 coils 34 incline to the coil 24 also in such this operation gestalt, When an external magnetic field H is especially added from the direction of [ around about 130 degrees ] to the boundary line L with the large effect difference of an external magnetic field in each coils 24 and 34, in order that a coil 34 may approach in the direction which intersects perpendicularly in the direction of line of magnetic force of the external magnetic field H, The difference of the magnetic flux which becomes easy to flow to a coil 24 side, and flows in each coils 24 and 34 can become small, and an external magnetic field H can cancel the effect of the magnetic noise by the external magnetic field, and can form an electronics control type machine clock strong against a magnetic noise. Therefore, said 2 or 3 effectiveness can also be done so.

[0090] In addition, this invention is not limited to each above-mentioned operation gestalt, and the deformation in the range which can attain the purpose of this invention, amelioration, etc. are included in this invention.

[0091] For example, although the effect of the magnetic noise by the external magnetic field was decreased by adjusting the number of turns of coils 24 and 34 with said 1st operation gestalt, the effect of a magnetic noise may be decreased by controlling the amount of maximum saturation magnetic flux of cores 23 and 33, permeability, etc.

[0092] What is necessary is just to specifically make the amount of maximum saturation magnetic flux of a core 23 larger than the amount of maximum saturation magnetic flux of a core 33. In this case, while is small, even if the area of the core stator section 22 is a core 23 side, balance with the magnetic flux which magnetic flux becomes easy to flow and flows by this to the core 33 side of another side where the area of the core stator section 32 is large becomes good, the difference of the magnetic flux which flows in each coils 24 and 34 becomes small, and it can decrease the effect of the magnetic noise by the external magnetic field.

[0093] Moreover, a core 23 may be formed with the quality of the material with permeability higher than the quality of the material of a core 33. Also in this case, while is small, even if the area of the core stator section 22 is a core 23 side, balance with the magnetic flux which magnetic flux becomes easy to flow and flows by this to the core 33 side of another side where the area of the core stator section 32 is large is improved, the difference of the magnetic flux which flows in each coils 24 and 34 becomes small, and it can decrease the effect of the magnetic noise by the external magnetic field.

[0094] Furthermore, although formed in the 2nd [ of the opposite side ] edge side (a core MAG flow section 23a side, the 33a side) with said each operation gestalt with the 1st edge (the core stator section 22 side, 32 sides) where the coil lead substrates 25 and 35 were formed in Rota 12 in each cores 23 and 34, you may prepare in said 1st edge side. However, it is desirable at the point that the way formed in the 2nd edge side can form the coil lead substrates 25 and 35 in core MAG flow section 23a and 33a parts in piles, can shorten the die length of a magnetic circuit at

this rate, and can decrease in number iron loss.

[0095] Moreover, with said operation gestalt, although each coil lead substrates 25 and 35 were formed in the same edge of each cores 23 and 33, one substrate of each coil lead substrates 25 and 35 may be formed in a 1st [ of each cores 23 and 33 ] edge side, and the substrate of another side may be formed in a 2nd edge side. In this case, even if it is winding each coils 24 and 34 in this direction on the basis of the 2nd edge, each adjoining terminal (for example, terminals 25b and 35a) can be connected, and each coils 24 and 34 can be connected to a serial. For this reason, since the direction of a volume of the coils 24 and 34 to each cores 23 and 33 is the same while being able to use a single-sided board for the circuit board and being able to reduce cost, the effectiveness of a coil activity can be improved and manufacture effectiveness can also improve.

[0096] Moreover, the direction of a volume of the coils 24 and 34 to each cores 23 and 33 may be made the same, and only the connection to the coil lead substrate 25 of one coil 24 may be made to cross between two coils 24 and 34, as shown in drawing 12 (cross). Also in this case, since each adjoining terminal (for example, terminals 25b and 35a) can be connected, each coils 24 and 34 can be connected to a serial and a single-sided board can be used as the circuit board, cost can be reduced.

[0097] Furthermore, with said each operation gestalt, although each coils 24 and 34 were wound in this direction to each coil lead substrates 25 and 35 (each cores 23 and 33), you may wind around an opposite direction mutually to each substrates 25 and 35. In this case, since each substrates 25 and 35 are arranged at the same edge of each cores 23 and 33, and the terminals which adjoin mutually are connected and each coils 24 and 34 can be connected to a serial, there is an advantage which can arrange each substrates 25 and 35 at the same edge of cores 23 and 33, and can use a single-sided board as the circuit board.

[0098] Moreover, the laminating of each cores 23 and 33 made into the two-layer core in the magnetic flow sections 23a and 33a of each cores 23 and 33 as shown in drawing 13 may be carried out as it is, and they may be constituted. In this case, in order to make connection with the circuit board 61 easy, the spacer 60 which arranges the height level of each coil lead substrates 25 and 35 is arranged. Although the part and components mark for which a spacer 60 is needed increase with such a configuration, the two-layer core which constitutes cores 23 and 33 can be formed in the same configuration, and there is an advantage which can lessen a components class.

[0099] Furthermore, what is necessary is for the configuration of the coil blocks 21 and 31 in this invention, a configuration, etc. to really which is not divided as a stator arranged to Rota 12 perimeter like the conventional example shown not only in said operation gestalt but in drawing 14 use a stator, and just to set up the concrete structure etc. suitably in operation.

[0100] Moreover, said each operation gestalt may be combined suitably. For example, in said 1st operation gestalt, the amount of maximum saturation magnetic flux and permeability of not only the number of turns of coils 24 and 34 but the cores 23 and 33 may be adjusted. Furthermore, also in said 2-7th operation gestalt, the number of turns of each coils 24 and 34 may be adjusted, or the amount of maximum saturation magnetic flux and permeability of cores 23 and 33 may be adjusted.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the top view of the electronics control type machine clock in the 1st operation gestalt of this invention.

[Drawing 2] It is the sectional view showing the important section of drawing 1.

[Drawing 3] It is the sectional view showing the important section of drawing 1.

[Drawing 4] It is the schematic diagram showing the magnetic flow section of the 1st operation gestalt.

[Drawing 5] It is a circuit diagram in the 1st operation gestalt.

[Drawing 6] It is the top view showing the important section in the 2nd operation gestalt of this invention.

[Drawing 7] It is the top view showing the important section in the 3rd operation gestalt of this invention.

[Drawing 8] It is the top view showing the important section in the 4th operation gestalt of this invention.

[Drawing 9] It is the top view showing the important section in the 5th operation gestalt of this invention.

[Drawing 10] It is the top view showing the important section in the 6th operation gestalt of this invention.

[Drawing 11] It is the top view showing the important section in the 7th operation gestalt of this invention.

[Drawing 12] It is the schematic diagram showing the modification of the magnetic flow section of this invention.

[Drawing 13] It is the schematic diagram showing the modification of the magnetic flow section of this invention.

[Drawing 14] It is the top view showing the conventional example of this invention.

[Drawing 15] It is the sectional view showing the conventional example of this invention.

[Description of Notations]

1 Barrel Vehicle

1a Spiral spring

2 Cope Plate

2a Dial

3 Wheel Train Carrier

7 No. 2 Vehicle

8 No. 3 Vehicle

9 No. 4 Vehicle

10 No. 5 Vehicle

11 No. 6 Vehicle

12 Rota

12b Rota magnet

20 Generator

21 31 Coil block

22 32 Core stator section

22a Extension

23 33 Core

23a, 33a Core MAG flow section

23b, 33b Core coil section

24 34 Coil

25 35 Coil lead substrate

25a, 25b, 35a, 35b End-winding child

41 42 Outside notch

50 Pressure-Up Rectifier Circuit

51 Pressure-Up Capacitor

52 Diode

54 Capacitor

54 Capacitor for Smooth

55 IC

60 Spacer

61 Circuit Board

H External magnetic field

L Boundary line

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[Translation done.]

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